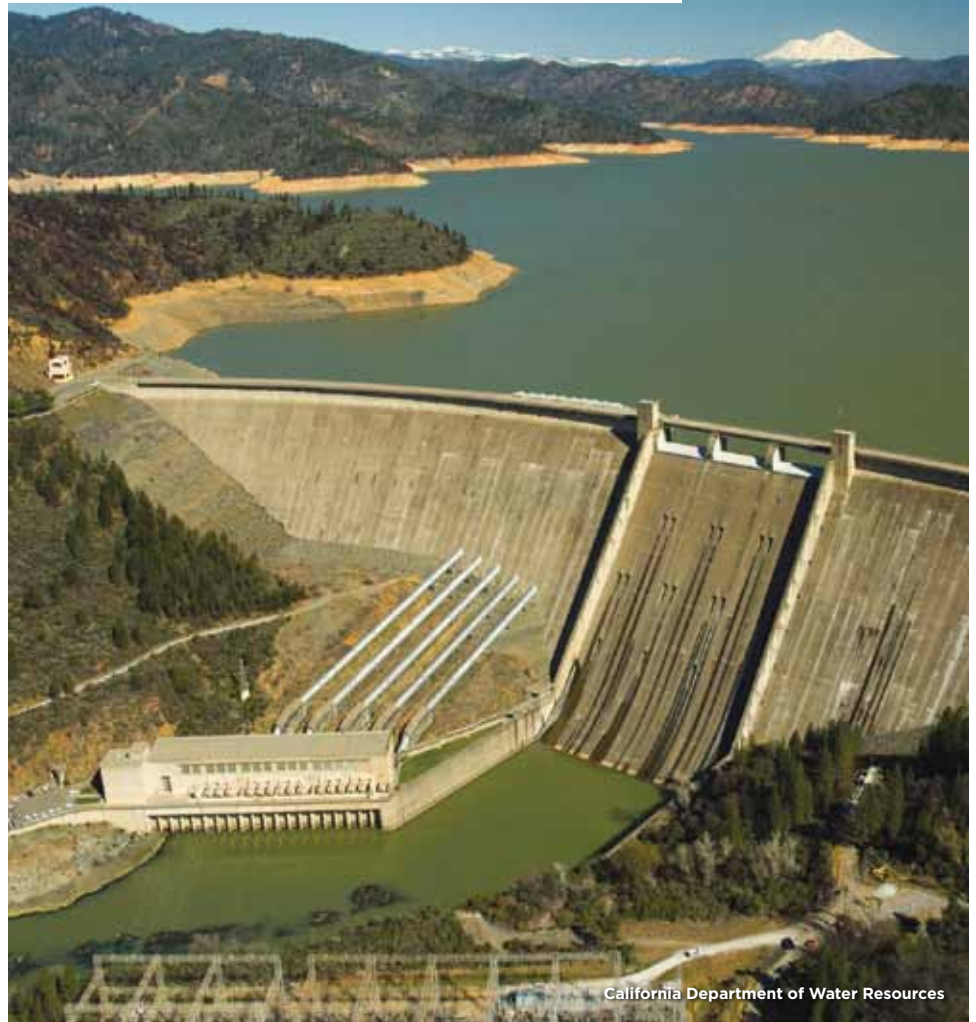


Bureau of Reclamation



The future holds great challenges for the nation's water resources. Shifting weather patterns, more damaging floods, and rising water shortages will threaten communities, the economy, and the environment. This chapter is part of a larger report, ***Weathering Change: Policy Reforms That Save Money and Make Communities Safer***, which shows what the federal government must do to help the nation confront these looming challenges.

To see the entire report, visit www.AmericanRivers.org

Introduction:

Over the past hundred years, the Bureau of Reclamation (Reclamation) has fundamentally reshaped the landscape of the American West. Reclamation was established in 1902 in order to construct large-scale irrigation projects that would encourage settlement and the growth of irrigated agriculture in sparsely populated western areas. The Bureau took this mission to heart and spent the next hundred years damming nearly every major river in the West. Today, Reclamation is the largest wholesale water supplier in the world, providing irrigation water to a fifth of western farmers while operating about 180 projects in 17 states. The Bureau's success in expanding irrigated agriculture has come at a significant and growing cost, however. Below market rates and entrenched water rights create an inflexible and inefficient system of water use that causes shortages for communities and ecosystems and leaves little room to adapt to a changing climate. There must be a comprehensive effort within each Reclamation basin to create greater flexibility and ensure that the needs of all water users, including the environment, are being met.



Agriculture consumes huge quantities of water in the West even as scarcity grows.

I. Today's Policy

An inflexible system of water use makes it difficult to meet the needs of communities, farmers, and the environment in increasingly water-scarce western states.

Growing competition over water: Many parts of the western U.S. face a looming water crisis. A growing population, inefficient water use, and increasing recognition of environmental water needs present a daunting challenge that will only grow in a changing climate. Water use already outstrips renewable supply in many places. The southwestern U.S. is making up for shortages by pumping groundwater faster than it can be replenished. The region currently exceeds renewable supply by 260 million acre-feet¹ every year, and the annual overdraft could increase to 2,253 million acre-feet over the next 100 years based on projected growth and climate change.² Such unsustainable water use cannot continue indefinitely.

Agriculture figures prominently in any discussion of western water use. Farming is an indispensable element of the western economy and western culture, but it is also by far the largest water user. In many cases this water is used to grow relatively low value crops. In California, field crops such as rice, cotton,

and alfalfa currently use about 63 percent of the state's irrigation water but account for only 17 percent of crop revenue.³ Meanwhile many cities are struggling to maintain a consistent water supply, and rivers are often left without sufficient water.

The Bureau of Reclamation controls huge quantities of water throughout the western U.S., — 40-85 percent of the annual flow in many western river basins — and 85 percent of the developed water it controls is used for agriculture.⁴ Reclamation sells water to irrigation districts under water contracts that can last up to 40 years.⁵ From the beginning, there were subsidies built into these contracts, and farmers were able to pay back the cost of irrigation projects over 50 years with no interest. These payments have often been reduced even further where it was determined that farmers were unable to pay the full costs. Much of the remaining costs for constructing and delivering water have been covered by proceeds from the sale of hydroelectric power generated at Reclamation facilities.

The Central Valley Project (CVP) in California provides one example of how this system works. Reclamation built an extensive system of dams, canals, and aqueducts starting in the 1930s to

collect water from northern California and deliver it to the San Joaquin Valley in the central part of the state. Irrigation water is sold to state-established water districts which in turn sell the water to farmers. Roughly 85 percent of the water delivered through the CVP is used for irrigation.⁶ The cost of the CVP was supposed to be recovered 50 years after the first water delivery contracts were signed in the late 1940s, but due to extremely low rates, only 18 percent of the original project cost had been repaid by 2005, despite the fact that no interest was charged.⁷ This constitutes a subsidy of up to \$416 million each year.⁸ The water is heavily discounted compared to the cost that other sectors in the region pay. Westlands Water District, for example, received water from the CVP at one fifth of its market value in 2005.⁹

While this system is only one part of the larger water problem the West faces, it has established a dependency on subsidized water and encouraged the expansion of irrigated agriculture to the point that there is little flexibility to meet rising needs in other sectors. A complex patchwork of water rights has entrenched these inefficient water use practices and created a system that is rigid and resistant to the change that is needed to adapt to growing water demand, a changing climate, and an increasing awareness of ecosystem needs.

II. Risks and Consequences

Climate change will greatly exacerbate the water challenges facing the West, a region that is uniquely vulnerable to rising temperatures and shifting precipitation patterns. In coming years, the Southwest will experience the greatest declines in precipitation. The region could lose 10 percent or more of its annual rainfall by the end of the century¹⁰ and transition to a climate similar to dust bowl conditions.¹¹ There will also be significant changes in the timing of precipitation. Many areas will receive less summer rainfall as precipitation shifts increasingly to winter months.¹² Declining snowpack will further exacerbate this problem by reducing the natural reservoir that has historically fed western rivers throughout drier summer months. Between 1950 and 1999 the amount of water stored in snowpack decreased in eight of nine western mountain regions.¹³ Losses ranged from 10 percent in the Colorado Rockies to 40 percent in the Oregon Cascades. Rising volatility will make precipitation less

dependable at all times of the year and could cause extended droughts with increasing frequency.

Farmers, cities, and the environment are all at risk due to this combination of climate change and an inflexible water management system. The status quo entrenches the vast majority of the region's water in one sector and leaves little room to adjust to changing conditions. Rivers are left with a fraction of their normal flow, which makes the environment and wildlife more vulnerable to climate change. This system makes all water users less prepared to adapt to the "new normal" and increases the risk of economic losses, environmental damage, and endless conflict over scarce resources.

III. Preparing for the Future

New basin-wide planning and reform efforts are needed to create a more flexible and efficient water system that can address existing shortages and prepare farmers, communities, and the environment for a changing climate.

Develop comprehensive, basin-wide water management strategies: Climate change is fundamentally altering when and where water is available in the West, and management approaches must adapt to these changes. A sustainable solution must bring about more efficient water use in all sectors and create a system that can respond to greater volatility and uncertainty. Shifting some water from low value agricultural uses during droughts may be one of the more economically efficient responses to shortages, but cities must also invest in conservation and efficiency. These changes must be done in a fair and equitable fashion that creates a viable future for western agriculture while also ensuring that reasonable needs of cities and the environment can be met. Clearly, there are no easy answers. Reclamation controls much of the water throughout the West, but the quantity and price of water it delivers are constrained by existing water contracts, federal and state laws, and a complex patchwork of state water rights. Even if it were politically feasible or desirable, Reclamation could not simply charge market rates for the water it delivers.¹⁴ Similarly, mandating larger water allocations for the environment could pose legal difficulties. This makes it difficult to reform existing practices, and there is no one-size-fits-all solution.

A comprehensive reform process is needed to ensure that the water resources under Reclamation's jurisdiction are being managed in a manner that will meet human and ecosystem needs in the future. A combination of voluntary water markets, investments in efficiency, increased allocations for the environment, drought planning, and periodic reviews of operations can help create a more flexible system that will meet multiple needs. In most cases this will require action by Congress and agreement from multiple stakeholders to navigate the complex legal questions surrounding western water. One example of a comprehensive reform process is the Central Valley Project Improvement Act (CVPIA) passed by Congress in 1992. This legislation authorized water transfers, implemented tiered water prices, created a fish and wildlife restoration fund, required water conservation measures, and shortened the length of water contracts. While differences in state water laws make elements of the CVPIA less feasible in other states, it nonetheless provides an example of a comprehensive attempt to move toward a more flexible system that better meets the needs of multiple users and the environment.

Congress has recently taken promising steps toward ensuring sustainable western water supplies through the SECURE Water Act.¹⁵ The Act instructs Reclamation to collaborate with other agencies to study the impact of climate change on water supplies, conduct analyses of future water availability and strategies for ensuring sufficient supply in each major river basin, and provide grants to improve water management. Reclamation has begun implementing the law through the WaterSMART Program and has already distributed millions of dollars in grants and provided funding for the first three basin studies.¹⁶ The studies in particular are an essential first step to crafting a sustainable long term solution. There is huge variation in available supply, demand, current water prices, and state water law that will significantly impact the mix of needed policy changes in different areas. Careful consideration of these variables is needed to ensure effective reform.

While the WaterSMART Program is an essential first step, there is clearly much more action needed to secure a sustainable water supply in the western U.S. For one, a limited number of basin studies are currently underway. Additional funding is needed to begin planning processes for all Bureau of

Reclamation project areas. Reclamation must also ensure that these plans meet the co-equal goals of securing a reliable water supply and protecting and restoring ecosystems. The Yakima Basin Study, for example, proposes actions that would enhance instream flows, fish habitat, and fish passage into climate resilient high elevation areas. Initial documents from the Colorado River Basin Study, however, did not incorporate consideration of ecological water needs, although there has been some progress in changing that.¹⁷ In any long-term planning effort, there also needs to be a stronger effort to define and quantify environmental water needs. A better understanding of how altered water flows can support overall ecosystem health is essential to ensuring a healthy environment and wildlife populations.

Most importantly, these plans must be turned into meaningful reform. For each basin, Reclamation must work together with Congress and local stakeholders to enact a suite of measures that will encourage efficient irrigation systems, ensure sufficient water for ecosystems, and create a more flexible system that can respond to changing climatic conditions. There should be periodic review and reoperation of all Reclamation projects in order to respond to these changes. Any new infrastructure constructed under basin planning processes must be subject to strict conditions: Beneficiaries must pay the full cost of any water distributed from new systems; users must meet water use efficiency requirements; there must be market mechanisms to ensure that water can more easily be shifted among different users; and the project must minimize environmental damages and set aside sufficient water to support ecosystem health.

In the near term, Reclamation should begin studies for other basins under its jurisdiction, and Congress should provide additional funding to support their completion. Even as these plans are being completed, Congress can take steps to improve water management practices. Increasing appropriations for WaterSMART grants can encourage farmers to install more efficient irrigation equipment. Reclamation could also encourage voluntary water markets under existing authorities and coordinate with other government agencies to prioritize additional water efficiency funds to the areas that face the greatest water shortages.

IV. Benefits of Being Prepared

Water systems in the West must become more flexible and more efficient in order to deal with a volatile and uncertain future. As the largest distributor of water in the West, the Bureau of Reclamation must be at the center of this shift. Voluntary water markets and drought planning can help create a system that is able to respond to changing conditions. In addition, more efficient water use can help reduce the region's vulnerability to rising shortages. Implementing several irrigation efficiency technologies throughout California would reduce agricultural water use by 17 percent or 6 million acre-feet.¹⁸ Already, Reclamation's WaterSMART grants have generated 700,000 acre-feet of water at a fraction of the cost of constructing water supply infrastructure.¹⁹ Water developed through the Blackrock Reservoir project in Washington state, for instance, cost 35 times more per acre-foot than the water gained from Reclamation's efficiency investments.²⁰ Clearly, more efficient irrigation is not the only answer, in part because excess irrigation water not absorbed by crops flows elsewhere and in some

cases is put to beneficial use by downstream users. However, increasing efficiency across all sectors is an important strategy for addressing rising water scarcity.

These reforms will benefit communities and the environment. Where conserved water is allowed to remain in the waterbodies from which it would otherwise be withdrawn, the resulting increase in water levels will improve ecosystem health and reduce stress on aquatic species. This in turn will make rivers systems better able to withstand the impacts of a changing climate. These reforms can also help avoid costly and damaging attempts to adapt to melting snowpack and lower summer flows. A smarter, more responsive water management system that provides for the environment, farmers, and communities can reduce the need for large-scale new infrastructure and save money in a time of rising budget shortages. In the process, we can ensure a more sustainable water supply and salvage some degree of predictability from an uncertain future. ■



Kay Ledbetter

More efficient water use can help buffer communities and farmers from more frequent droughts



Better planning and more flexible water management can help ensure that there's enough water for people and rivers.

- ¹ An acre foot of water is about 326,000 gallons of water or the amount that the average American household uses in a year.
- ² Ackerman, F. and Stanton, E.A. *The Last Drop: Climate Change and the Southwest Water Crisis* (Stockholm Environment Institute, 2011)
- ³ Cooley, H., Christian-Smith, J. and Gleick, P. *Sustaining California in an Uncertain Future* (Pacific Institute, 2009).
- ⁴ Congressional Budget Office. *Water Use Conflicts in the West: Implications of Reforming the Bureau of Reclamation's Water Supply Policies* (1997).
- ⁵ Moore, M. The Bureau of Reclamation's new mandate for irrigation water conservation: purposes and policy alternatives. *Water Resources Research* 27, 145-155 (1991).
- ⁶ General Accounting Office. *Bureau of Reclamation: Water Marketing and Costs at the Central Valley Project* (GAO-01-553, 2001).
- ⁷ Cooley et al., 2009, *op cit*.
- ⁸ Environmental Working Group. *California Water Subsidies* (EWG, 2004).
- ⁹ Walker, B. and Sharp, R. *Why Westlands Water District's New Contract is all Wet* (Environmental Working Group, 2005).
- ¹⁰ Christensen, J.H. et al. in *Climate Change 2007: The Physical Science Basis* (eds Solomon, S. et al.) Ch 11, 848-940 (Cambridge Univ. Press, 2007).
- ¹¹ Seager, R. et al. Model projections of an imminent transition to a more arid climate in southwestern North America. *Science* 316, 1181-1184 (2007).
- ¹² Christensen, J.H. et al., 2007, *op cit*.
- ¹³ Barnett, T. Human-induced changes in the hydrology of the Western United States. *Science* 319, 1080-83 (2008).
- ¹⁴ Mecham, D. and Simon, B. Forging a new federal reclamation water pricing policy: legal and policy considerations. *Arizona State Law Journal* 27, 507 (1995).
- ¹⁵ Omnibus Public Land Management Act of 2009. Pub. L. 111-11. 123 Stat. 1329. Subtitle F — Secure Water (March 30, 2009).
- ¹⁶ Hearing before the Water and Power Subcommittee on the Bureau of Reclamation's WaterSMART Program and Implementation of the SECURE Water Act. 111th Congress. 2010 (testimony of Michael Connor).
- ¹⁷ Hearing before the Water and Power Subcommittee on the Bureau of Reclamation's WaterSMART Program and Implementation of the SECURE Water Act. 111th Congress. 2010 (testimony of Melinda Kassen).
- ¹⁸ Cooley et al., 2009, *op cit*.
- ¹⁹ Hearing before the Energy and Water Development Appropriations Subcommittee. 112th Congress. March 10, 2011 (testimony of Michael Connor, Bureau of Reclamation Chief).
- ²⁰ *Ibid*.